Master Thesis of Forest Environmental Science

Local People Participation in Mangrove Restoration Projects: Impacts on Social Capital and Livelihood

-A Case Study in the Philippines-

지역주민의 맹그로브 복원사업 참여 : 사회적 자본과 생계수단에 미치는 영향 -필리핀 사례를 중심으로-

August 2019

Graduate School
Seoul National University
Department of Forest Sciences

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A Thesis as a Partial Requirement for
Master of Science Degree in
Forest Environmental Science

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Abstract

Climate change is a global problem caused by cumulative actions of multi-level actors; hence, solving the climate change problem requires collective action. Networks have been created to establish cooperation and collaboration between multi-level stakeholders; this facilitates the exchange of knowledge and strengthens the cooperation between countries and stakeholders. Cooperation is not only relevant for actions against climate change, but it also contributes to the development of the local communities by increasing their social capital through their involvement and participation in climate change mitigation projects. Through social relations, local communities expand their assets which are relevant to gaining more economic profits. This study assessed the impacts of local community participation in mangrove restoration projects to social capital; and further analyzed its implications people's access to information and access to services—both variables are essential in improving one's livelihoods. This study was conducted in the Province of Quezon, Philippines using face-to-face interview as the main method for data collection. The results of this study suggest that participation is beneficial to the local people as it can improve their livelihoods. Their participation increases social capital, consequently, improves their access to information and access to services.

Keywords: mangrove restoration, social capital, local livelihood, participation, Philippines

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For Coy, Lyn, and Rolly – my ever-supporting family.
Thank you for all the sacrifices!

Table of Contents

List of Tables

List of Figures

List of Appendices

Acronyms

AFA	Alitas Farmers Association
BIPCO	Binonoan Producers Cooperative
CBFM	Community-based Forest Management
DA	Department of Agriculture
DOST	Department of Science and Technology
DOT	Department of Tourism
DTI	Department of Trade and Industry
NGP	National Greening Program
PES	Payment for Environmental Services
PO / POs	People's Organization/s
REDD+	Reducing Emissions from Deforestation and forest Degradation
SLSU	Southern Luzon State University

1. Introduction

1.1. The Problem and Rationale of the Study

Participatory management is one of the key strategies for natural resource protection and conservation adopted by many countries. It recognizes the need to address social and environmental components collectively as one affects the other (Adams & Hutton, 2007; Porter-Bolland et al., 2012). The participatory approach further acknowledges the local communities and its people as the cornerstone of its management strategies; hence, their participation is essential and crucial to its success. However, the active participation of the local people is contingent to the provision of incentives and benefits (Agrawal & Gupta, 2005; Cuenca, Robalino, Arriagada, & Echeverrı, 2018; Moukrim et al., 2019; Paudyal, Thapa, Neupane, & Kc, 2018; Sirivongs & Tsuchiya, 2012). In contrast, receiving no benefits forfeits the social objective of the participatory forest management; consequently, dissuades participation of the local people.

Participatory approaches, such as community-based strategies, have become a widely accepted approach for forest management worldwide with the assumption that local people would use and manage the forest resources sustainably (Agarwal, 2001; Shrestha & McManus, 2008), and also the case of the Philippines (Lasco, Pulhin, Bugayong, & Mendoza, 2011). Furthermore, the Philippine government have also considered the local communities as the *de facto* managers and guardians of the forest (J. M Pulhin, Inoue, & Enters, 2007). The Department of Environment and Natural Resources (hereinafter referred to as DENR), the leading agency handling environmental concerns in the Philippines, have further reinforced the role of the local community participation in forest management and in actions against climate change. The country has also emphasized the inclusion of the local communities in the Reducing Emissions from Deforestation and Forest Degradation (hereinafter referred to as REDD+) projects (DENR-FMB, 2012, 2016) and in their National Safeguard Strategy (DENR-FMB, 2016).

In theory, the participatory approach would lead to a "win-win" result: environmental sustainability and social development; however, its on-site implementation encountered several constraints and yields to unsuccessful results (i.e. Karki, 2013; Mannigel, 2008; Méndez-López, García-Frapolli, Ruiz-Mallén, Porter-Bolland, & Reyes-Garcia, 2015). The provision of benefits and incentives for local communities seems to be problematic as well (Agrawal & Gupta, 2005; Fox & Cundill, 2018). Furthermore, the local communities and their dependency to forest resources have also caused major problems to forest. A study in the Philippines was conducted to determine the drivers of deforestation and forest degradation as part of the REDD+ project implementation. The result of the study revealed that local communities and their activities are among the major causes of deforestation and forest degradation (DENR-FMB, 2016). Carandang (2006) pointed-out the people's poverty in the Philippines have pushed them to rely heavily on the forest that have created such environmental problems. The United Nations (1987) Brundtland Report have also indicated this concern for the international cases. This highlights the interrelation of the environmental and social problems; therefore, it can be argued that an optimal solution to deforestation and forest degradation must cover both environmental and social elements. For this reason, this study looked at the impacts of participation in natural resource management to people's social capital. We further argued that the increase in social capital would lead to increase access to other forms of capital (Flap, 1989) that will motivate people to continually be involved in resource conservation and management projects, hence, providing a sustainable social-environmental solutions. The development of social capital may lead to improve the communities' and the people's livelihood towards further development-a key factor for to reduce forest dependency which may lead to deforestation and forest degradation.

This research tries to shed light on these problematic on-site situations in the participatory management by conducting a case study in the Philippines. Particularly, this research focused on the intangible impacts of the participation, specifically, the effects to social capital, access to information, and access to services, as these may motivate people to participate in resource management.

Social capital covers more than people's connections and engagements with other actors. Bourdieu (1986), Lin (2001), and Portes (1998) have argued that social capital also includes the people's access to resources owned by the actors within one's social networks–the embedded resources. Portes (1998) defined social capital as the "assets gained through membership in networks." These theoretical definitions of social capital have led the researchers to hypothesize that the increase in social capital would lead to the increase in access to information and access to services which are essential in enhancing one's livelihood. Offering social capital as an incentive may have greater impacts, in comparison to other tangible incentives, in terms of improving a person's overall well–being as its development also enhances the accumulation of other forms of capitals (Flap, 1989). From the perspective of the poor, the increase in the access and the ownership of assets provides better means and more alternatives to get resources for people's needs and subsistence. These conditions are favorable for environmental protection and conservation as it diminishes the dependency of people to natural resources which have been identified as a major driver of deforestation and forest degradation.

1.2. Research Objectives

The general objective of this research is to understand how participation in natural resource management projects affects the local people. Specifically, the study aims to achieve the following:

1. to determine the effects of participation in natural resource management on the social capital of the local people; and,

2. to determine the impacts of social capital to people's access to information and access to services.

1.3. Research Questions and Hypotheses

1. Does participation in natural resource management increases the social capital?
   Hypothesis #1: Participation in natural resource management increases social capital.

2. Does the increase of social capital increases access to resources and services, and the access to information in the community?
   Hypothesis #2: The increase in social capital improves people's access to information and access to services.

1.4. Significance of the Study

This study can contribute to the improvement of the management of forest resources; specifically, through participatory management approach. Furthermore, this study is very timely due to the increasing recognition of forests in actions for mitigating climate change; on the other hand, deforestation and forest degradation exacerbate the climate change problem. Combined with the agriculture, and other land use (AFOLU) sector, it ranks second in terms total carbon contributions (Smith et al., 2015; Victor et al., 2014). This highlights the major importance of forest and its sustainable management in our battle against climate change.

2. Literature Review

2.1. The Philippine Mangroves

The country has lost a significant amount of mangrove areas from 1918 (half a million hectares) to 1994 (120 000 hectares) (Primavera & Esteban, 2008; Primavera, 2000). The decrease of mangrove areas was mainly caused by the development of aquaculture farms and overharvesting of mangroves for fuelwood use (Primavera, 2000; Pulhin, Gevaña, & Pulhin, 2017). The conflicting policies of mangrove land-use had also worsened the problems on mangrove cover loss (Friess et al., 2016; Pulhin et al., 2017). In addition to this, very few initiatives were made by the Philippine government to protect the mangrove forests; not until the 1970s, when the ecological benefits were realized (Buitre, Zhang, & Lin, 2019). As response, revisions on the forestlands zoning were made to strengthen the management and the conservation of the mangrove areas in the 1980s (Primavera, 2000). New legislations were also enacted, such as the Republic Act 7161 or Act of Incorporating Certain Sections of the National Revenue Code in 1991 and the Section 71 of Republic Act 7161 that bans commercial cutting of all mangrove species for timber or firewood, to support these management strategies (Pulhin et al., 2017). Furthermore, through the enactment of Executive Order No. 263 (Community-Based Forest Management), participatory management became a key approach in ensuring sustainability of the forestland resources (Primavera & Esteban, 2008). This had also led to the recognition of the role of the local communities in the mangrove ecosystems protection, conservation, and management.

However, the need for a more intensive restoration of the mangrove ecosystems was highly realized following the occurrence of the super typhoon Haiyan ("Yolanda") in the year 2013 (Panay News, 2017) that killed more than 6000 people in the Philippines (Bueza, 2016). This has led for the government to implement the Mangrove and Beach Forest Development

Project (MBFDP), as part of the National Greening Program, that aims to restore mangrove areas in the country in collaboration with the local government units, private sectors, non-government organization, and other concerned stakeholders (DENR-R6, 2019). The role of the local communities was also emphasized in the MBFDP where local groups were contracted in the restoration of the lost mangrove areas.

These initiatives, along with the strengthened policies on resource management, have led to the decline in the rate of mangrove deforestation in the country (Pulhin et al., 2017). The 2015 Philippine Forestry Statistics also shows that mangrove forest cover in the country have reached more than 300 000 hectares (DENR-FMB, 2017a). The local communities and their role as co-stewards of mangrove ecosystems have also contributed to the success of its management and restoration (Gevaña, Camacho, & Pulhin, 2018). The Philippine government has put high regards to the local communities as their partners in managing the forests and mangrove resources (Walters, 2004).

2.2. People's Involvement in Forest Management

The governance of forest has adopted participatory approaches in the belief that this strategy would yield to environmental sustainability while also accounting for social concerns (Agarwal, 2001; Fox & Cundill, 2018; Karki, 2013; Mannigel, 2008). This shift, from direct control management by the government, does not only represent the involvement of the local communities in forest management, but also created an avenue for power distribution from a top-down standpoint to a more bottom-up system (Agarwal, 2001). Research findings have also served as proofs that the long-standing strict and exclusionary conservation caused pressures to local communities such as displacement and restriction of the use of resources (Adams & Hutton, 2007; Eriksson, Johansson, & Blicharska, 2019; Fox & Cundill, 2018; Lele, Wilshusen, Brockington, Seidler, & Bawa, 2010). On the other hand, participatory management-a more people-centered approach-in theory, would produce "win-win" results: a strategy for

resource protection and conservation, as well as, for delivering benefits to local communities (development, financial assistance, empowerment) and for the legal opportunities to use and harvest resources in supposedly sustainable way (Adams & Hutton, 2007; Porter-Bolland et al., 2012).

The potentials of the participatory management have led countries to adopt this strategy; however, even with its worldwide recognition, deforestation still is a major concern, as shown by the decreasing worldwide forest cover (World Bank, n.d.). In addition, the implementation of the participatory scheme has its own predicaments in which several cases have yielded unsuccessful results. Other cases of participatory forest management have even resulted to conflicts between the forest managers and the local communities (e.g. Karki, 2013; Mannigel, 2008; Méndez-López, García-Frapolli, Ruiz-Mallén, Porter-Bolland, & Reyes-Garcia, 2015). The provision of benefits and incentives for local communities seems to be problematic as well (Agrawal & Gupta, 2005; Fox & Cundill, 2018). These circumstances may have led to diminish the participation of the local communities resulting to the failure of the participatory approach.

The cornerstone of the participatory approach are the local communities and their participation is crucial for its success. Stimulating active participation from the local communities requires the provision of incentives such as financial assistance, empowerment, livelihood sources, and development programs (Agrawal & Gupta, 2005; Cuenca et al., 2018; Moukrim et al., 2019; Paudyal et al., 2018; Sirivongs & Tsuchiya, 2012). Furthermore, there is a spillover effect on the incentives and benefits beyond to those who participate, therefore participation also benefits the community in achieving development (Adams & Hutton, 2007; Agarwal, 2001; Agrawal & Gupta, 2005). In contrast, receiving no benefits forfeits the social objective of the participatory forest management and dissuades people from participating. The studies of Cao, Wang, Song, Chen, & Feng (2010) and Cao, Wang, & Wang (2009) have stressed that the sudden and untimely discontinuation of the provision of benefits could cause the local people to revert to their old unsustainable practices in forest product utilization. However, it is important to understand that a perpetual supply of

benefits for the people is irrational and inefficient; the benefits from participation should function as a means to improve people's capacities and capabilities to achieve self-reliance and self-governance in able to realize sustainability.

Participatory management recognizes that social and environmental components should be collectively addressed as one affects the other. Focusing on forest management, forest-dependent people has been identified as a major driver of deforestation and forest degradation problems (DENR-FMB, 2017; Le, Smith, Herbohn, & Harrison, 2012; Situmorang, 2018). Newton, Miller, Augustine, Byenkya, & Agrawal (2016) described forest-dependent people as the "human populations that derive benefits from forests in some way…and is often used to refer to rural people living in poverty, including indigenous and traditional people, in substantially-forested developing countries." Their participation in forest management would increase the effectiveness of the participatory approach as it addresses overreliance to forest resources. Furthermore, the benefits from their participation in forest management provide the alternatives for their needs and sources of livelihoods. Characteristically, as Newton et al. (2016) have referred, forest-dependent people commonly refers to people in rural areas under poverty. The World Bank (2001) has described the poor as those who are lacking in freedom, choices, and resources to improve their own well-being, and are deprived of assets, resources, and rights to make their lives better-based from the book Development as Freedom by Amartya Sen (1999) that construed poverty as people's freedom to processes and opportunities. World Bank (2001) report also explained the causes of poverty from the perspective of the poor: "(1) the lack of income and assets to attain basic necessities; (2) the sense of voicelessness and powerlessness in the institutions of state and society; and, (3) vulnerability to adverse shocks, linked to an inability to cope with them," which Sen referred to as the unfreedoms. Having no (or limited) opportunities, the poor are forced to rely on the forest resources (Gray & Moseley, 2005; Jannat, Hossain, Uddin, & Hossain, 2018; Jehan & Umana, 2003; Kumar, 2002; Nhem, Lee, & Phin, 2018; Ostrom, Burger, Field, Norgaard, & Policansky, 1999; Sundar, 2019; United Nations, 1987). On the other hand, providing a more and better opportunities can create alternatives for forest-dependent

people, whilst, putting less pressure to forest resources and contributing to its conservation.

2.3. Social Capital

The concept of social capital centers on people's relationships and engagement between actors. Definitions of social capital proposed by different scholars are presented in table 1. In these definitions, social capital focuses more on the assets more than the social relations *per se* and highlight two main points. First, social capital is produced by building social relationships with others; meaning it requires having at least two actors to build social capital. Secondly, social relations function as investments to gain more resources that can further the opportunities and benefits of the individual or the group towards their development. These points cover the two dimensions of the social capital which were highlighted in this research: the social relations and the embedded resources.

Table 1. Definitions of social capital.

Social Capital	References
"an entity, consisting of all expected future benefits derived, not from one's own labour, but from connections with other persons."	Flap (1989)
"the connections and relationships between individuals and/or groups that leads to aggregation of capitals"	Bourdieu (1986)
"features of social organization, such as trust, norms, and networks, that can improve the efficiency of society by facilitating coordinated actions."	Putnam (1993)
"refers to assets gained through membership in networks."	Portes (1998)
"capitals captured through social relations." "resources embedded in social networks accessed and used by actors for actions."	Lin (2001)

"stock of assets (networks, institutions) that can be drawn upon for productive ends and a flow of assets (social participation, collective action) aimed at reinforcing existing social capital."	Tiepoh & Reimer (2004)
"the resources available to individuals and groups through membership in social networks."	Carrillo Álvarez & Riera Romaní (2017)

Accumulation of social capital requires building of social relations (ties and networks) with other actors. Social relations can benefit people in two ways: (1) having connections with people that are "prepared and obliged to provide help and support" (Flap, 1989); and, (2) access to embedded resources owned by the people within their networks (Lin, 2001; Portes, 1998; Putnam, 2000; Teilmann, 2012; Tiepoh & Reimer, 2004). Through these social relations, a person can gain control over resources that he originally does not own (Lin, 2001; Portes, 1998). In Lin's (2001) theory of social capital, he elucidated that each member of a group is recognized as a "custodian of the limits of the group" and each has an influence in the decision making. Accordingly, being a member of a group, a person can influence how the resources can be used to their advantage. From a perspective of a poor, benefits of social capital can improve one's status in the society as it contributes to improve a person's recognition as well as to increase his assets (Sen, 1999; World Bank, 2001). Table 2 presents empirical researches on social capital.

Table 2. Empirical researches on social capital.

Research findings/conclusions on social capital	Reference
Social capital may positively or negatively affect organizational outcomes in three general courses: (1) increased and/or more complex forms of social capital, reduced; (2) transaction costs; and, (3) organizational advantage.	Hazleton & Kennan (2000)
The study identified that social capital is positively associated with the participation	Gurney et al. (2016)

in marine protected area management. In particular, they have determined that being a member of a community organization and their active involvement in decision making increase the probability that the individual will participate in the decentralized management of common resources.	
Social capital positively affects the livelihood diversity of the rural people. A person, who is trusted and with good relationship with others, tends to receive more assistance from neighbors and be involved in their activities.	Avila-Foucat & Rodríguez-Robayo (2018)
Improvement of social capital of the community improves management of tourism projects. It contributes to reducing the level of poverty by improving the economic conditions of the host community.	Prayitno, Sari, & Putri (2019)
Enhancing collaboration and social relationships between government, grassroots organizations, and communities improve the effectiveness and efficiency of government-implemented projects. Collaboration between groups broadens the solution options for environmental problems, thus, heightens the resiliency of the community against environmental disasters. Social capital is considered as a factor of collaboration. The study argues that the higher the social capital and the stronger the bond within the community will improve the collaboration with people.	Morris, McNamara, & Belcher (2019)

2.4. Factors Affecting Social Capital

As defined by scholars, social capital are the resources captured from social relations (i.e. Carrillo Álvarez & Riera

Romaní, 2017; Portes, 1998). In this regard, the number of ties and networks of a person is a major factor that determines his social capital. However, the increase of the of social relations may not always increase one' s social capital as several factors may affect the amount of resources a person can access through his social relations. This study focused on three factors, namely: (a) diversity of social relations; (b) resource accessibility and social capacity; and, (c) trust.

2.4.1. Social Relations and its Diversity

Theoretically, a larger size of social relations corresponds to having higher social capital as these social relations function as the sources of the embedded resources (Flap, 1989; Teilmann, 2012; Tiepoh & Reimer, 2004; Woolcock & Narayan, 2000). However, as elaborated by Teilmann (2012), "not all ties are similar." Each tie is different from the other and on the amount of resources and information he possesses, therefore each tie and network impacts to a person also varies. For instance, person A is a member of three local labor organizations in their village while person B, living in the same village, is also a member of three organizations, but of different nature: a local labor organization, a municipal-level organization, and a business group. *Ceteris paribus*, we can expect that the resources and information accessible to person B, through his social relations, exceeds than of person A albeit both having the same number of networks. The major difference between person A and person B is the homogeneity of their organizations. The organizations of person A, being homogenous, may have provided the same resources and information. On the other hand, person B, having a more heterogenous network, can have access to more diverse resources-i.e. farming tools from the local labor organization, information about the increasing prices of fertilizers for vegetables from the municipal-level group, and financial aid from the business group.

The types of the social relations a person is associated with affects the quantity and the diversity of resources he can access. Two of the most common dichotomous of social relations were provided by Granovetter (1973) and Putnam (2000). Granovetter (1973) differentiated strong ties from weak ties. Strong ties are those relations that are readily available and can

be easily established (Granovetter, 1973) and "does not require much maintenance" (Teilmann, 2012), i.e. family members, friend, and neighbors. Meanwhile, weak ties are the connections that are more distanced (Dasgupta, Putnam, & Dasgupta, 2005; Granovetter, 1973), i.e. business groups and professional connections. Putnam (2000), on the other hand, classified social relations between bonding and bridging. Bonding social capitals are the relationships with the homogenous individuals and groups (closely related to the concept of strong ties) while bridging social capital are the connections with people and groups from other social classes (closely related to the concept of weak ties) (Kay, 2005; Putnam, 2000; Villalonga-Olives & Kawachi, 2015). Even though the linkage and the relationship of actors are stronger in the strong ties and bonding social capital, it may not be enough to produce sufficient benefits, opportunities, and impacts to improve one's condition, for this purpose, it is necessary to establish weak ties and bridging social capital. Furthermore, the work of Woolcock & Narayan (2000) has explained that for the poor, bridging social capital are more important since it lets the poor to "get ahead" by accumulating more resources and better opportunities. Although bonding social capital is also relevant, it can only help them to "get by."

2.4.2. Resource Accessibility and Social Capacity

Social relations are sources of information and resources; having social relations benefits a person as it increases his assets (Bourdieu, 1986; Lin, 2001). All social relations and social structures can improve one's social capital (Coleman, 1988), however, just having social relationships may not be sufficient enough to advance one's condition and status. A person should be able to utilize his social relations for it to be beneficial. As each tie is different, its impacts to a person also varies. Simply put, if person A and person B established connections with group Z, this may not mean that the impacts of group Z to person A and person B is the same or equal. Each person has his own capacity to utilize their established social relations and their embedded resources-the social capacity. Tiepoh & Reimer (2004) defined social capacity as the "ability of rural people to organize and use their social capital and other assets through various social structures and processes to achieve valued economic objectives." Lin (2001) also highlighted this concern in his theory of social

capital elaborating that the access and use of the social resources are dependent on the ability of the individual. Those people who can use their social relations more effectively are expected to have higher income (Tiepoh & Reimer, 2004).

2.4.3. Trust

"Trust is a basic element of the relational dimension" (Nardone, Sisto, & Lopolito, 2010) and the most essential element of social capital (Kay, 2005). Building and maintaining social relations requires trust (Putnam, 1993a) as people only forms ties with people or organizations they trust. In addition, trust functions as the lubricator for interaction and cooperation between actors (Teilmann, 2012). Groups exhibiting trust to its members can accomplish more compared to those without trust (Coleman, 1988, 1990; Sandefur & Laumann, 1998). Furthermore, trust is necessary to utilize social relations while having no trust depletes the purpose of social capital – contribution and sharing of the embedded resources (Kay, 2005; Portes, 1998). Without trust, a tie cannot be formed as no rational person will cooperate with someone without a proof that he is trustworthy. In Putnam's (1993) classical example of rotating credit association, he elaborated that without proof, the association cannot accept every person who wants to join unless there is a proof that he will pay the contributions and will not quit the after he receives his credit. This is also true at the micro–level, in accepting members of the organization, the person' s trustworthiness matters. This can be proven based on his reputation from other people and from his track record. A person with a good reputation can be trusted (Putnam, 1993a, 2000).

Trust also fortifies the realization of commitments of the people who are part in the social relations. In Coleman's (1988, 1990) expectation–obligation concept, a trusted person is pressured to keep the end of his bargain and to perform what the others expect him to do. Failing to do so might diminish the trust of the other party which can damage their relationship and impede future cooperation. Moreover, trust, when it is mutual to both parties, can result to social solidarity that exists when there is generalized reciprocity and commitment between and among actors in social relations (Sandefur & Laumann, 1998). Social solidarity, as explained by Sandefur and Laumann, can be

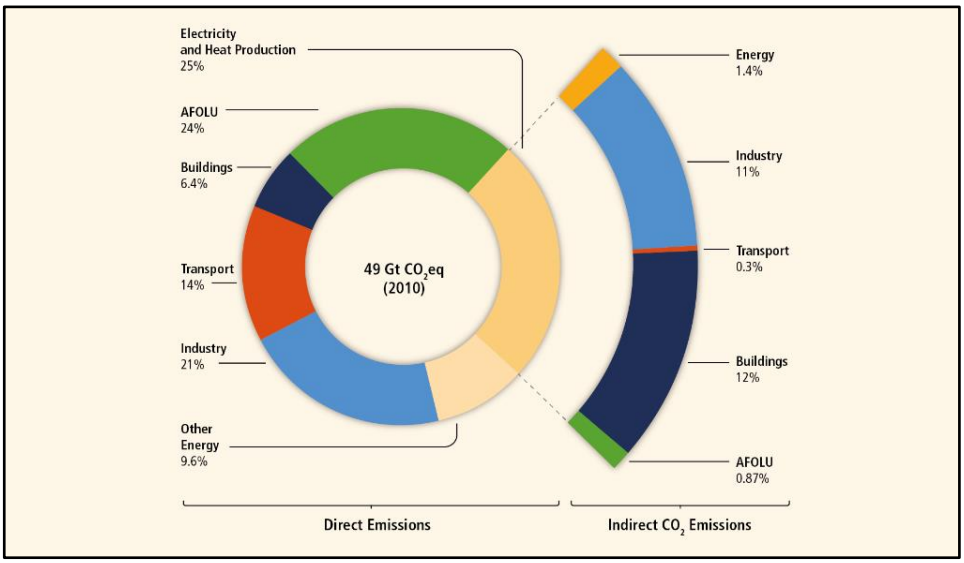
observed when people are mutually obligated to help those in their networks in the times of need since they also received help from them previously. Repeated engagement and cooperation strengthens trust that reinforces social relations (Dasgupta et al., 2005; Fukuyama, 2001; Putnam, 1993a).

2.5. The Global Problem and the International Networking

Climate change is a global problem that can adversely affect all people regardless of nationality and country. Solving this problem requires collective action (Ostrom, 2010). As defined by the UNFCCC (1992), it is the "change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods." As a global response, international collaborations have been initiated for the purpose of creating solutions for this dilemma, e.g. the Kyoto Protocol and the Paris Agreement. These agreements aim to combat climate change by reducing national level emissions (Kyoto Protocol, 1998; Paris Agreement, 2015). Furthermore, through different mechanisms and programs, countries were able to work together in able to achieve their national emission targets, e.g. Clean Development Mechanism and International Emissions Trading (UNFCCC, 2012).

The role of agriculture and forest were also highlighted as major contributors to the global carbon emitted into the atmosphere. The agriculture, forestry, and other land use (AFOLU) sector ranks second in terms total carbon contributions, next only to electricity and heat production sector (Figure 1) (Smith et al., 2015; Victor et al., 2014). Moreover, the loss of forests and its degradation were also recognized as major sources of carbon emissions (Forest Carbon Partnership Facility, 2017; Holloway & Giandomenico, 2009; Smith et al., 2015; UNFCCC, 2012) as it contributes 11% of the total greenhouse gases (UN-REDD Programme, 2016). This incited international programs for the protection, conservation, and reforestation of forest areas as a mitigation measure against climate change. One of the more recognized approaches for this

purpose is the reduce emissions from deforestation and forest degradation, popularly known as REDD+. It is a program that credits the actions of the developing countries in reducing their emissions through (a) reducing carbon emissions from deforestation; (b) reducing carbon emissions from forest degradation; (c) conservation of forest carbon stocks; (d) sustainable management of forests; and, (e) enhancement of forest carbon stocks (UN-REDD Programme, 2016).



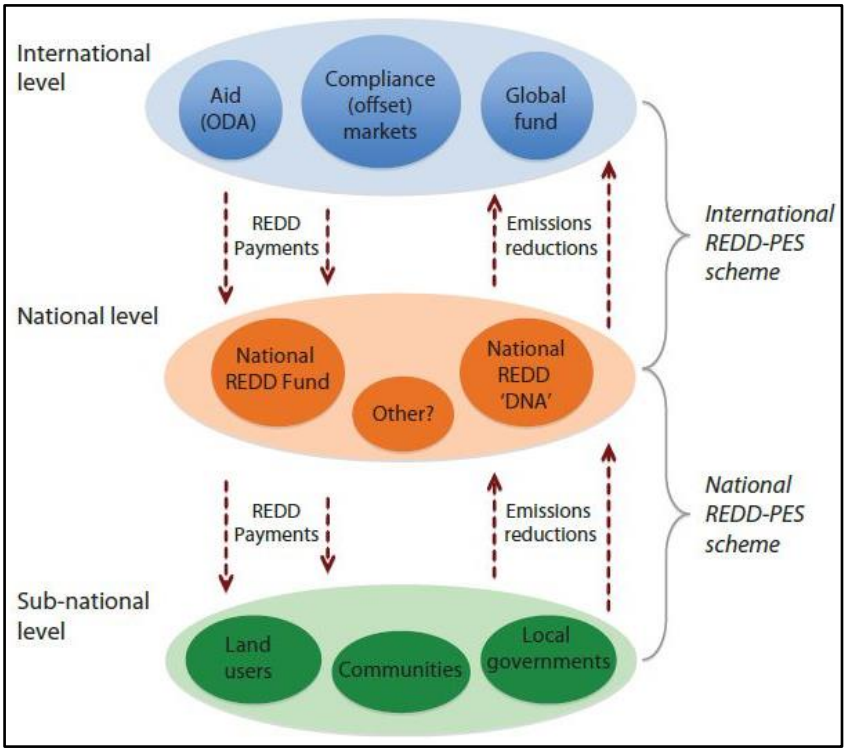
Source: (Victor et al., 2014)

Figure 1. Greenhouse gases emissions by economic sectors.

Negotiations and conferences had become a channel for countries, both developed and developing, to voice-out their stands and be recognized by others. One infamous example happened during the 2005 Conference of the Parties 11 in Montreal, where the governments of Papua New Guinea and Costa Rica requested the agenda for reducing emissions from deforestation in developing countries. This was recognized by the other Parties had become the starting point of REDD+ that acknowledges the role of the developing countries in protecting their forests as part of the mitigation efforts (Holloway & Giandomenico, 2009).

Climate change mitigation projects have also paved the way for establishing connections and networks between countries and players for achieving a common goal. Networking

has also created benefits and opportunities for the local-level stakeholders. In the conceptual model of a multi-level REDD payments for environmental services (PES) scheme proposed by Angelsen & Wertz-Kanounnikof (2008), vertical and horizontal networking in REDD can be observed (Figure 2). In vertical networking, the emissions reduction from the sub-national level projects are accredited at the national and international level. Then, the international level offers finance to the national level and is transferred to the sub-national level. This presents benefit transfer to and from the three levels. Meanwhile, in horizontal networking, focusing on the sub-national level, shows the potential of collaboration between land-users, communities, local government, and other local-level players. The establishment of the horizontal connections in REDD+ may strengthen the cooperation between the players that creates further opportunities for them (this will be discussed more in the next part). Aside from financial benefits and strengthening of ties, participation in climate change projects also improves asset ownership of the community and local people, they are also receiving capacity buildings, technology transfer, trainings, as well as livelihood programs (Bayrak & Marafa, 2017; Herr, Blum, Himes-Cornell, & Sutton-Grier, 2019).



Source: (Angelsen & Wertz-Kanounnikof, 2008)

Figure 2. The conceptual model of a multi-level REDD ‘payments for environmental services’ (PES) scheme.

3. Methodology

3.1. Conceptual Framework

To this point, we already had established that social capital is more than just ties and networks, but also covers the resources embedded in one's social relations. Through social relations, resources are being contributed, shared, and become accessible for those who are part of the network (Bourdieu, 1986; Carrillo Álvarez & Riera Romaní, 2017; Lin, 2001; Portes, 1998). Social capital in this study uses the definition by Lin (2001) as the "capitals captured through social relations… with expected returns in the marketplace." In addition, Nan Lin's theory of social capital was built with two assumptions: first, "actions are primarily driven or motivated by the innate need for survival;" and second, "survival is seen as dependent upon the accumulation of valued resources." From this, we can argue that people build and maintain social relations as they perceive that it is advantageous in accumulating resources and assets. In contrast, people will not engage and maintain their connections if they perceive that it is not beneficial. Furthermore, the theory tacitly suggests that the concept of social capital is understood by its function which was also argued by Coleman (1988). Scholars such as Bourdieu (1986), Flap (1989), and Tiepoh & Reimer (2004) also supports this view and dispute that social capital is a productive asset that facilitates social and economic improvement. People and communities with better network and higher social capital have a higher possibility of achieving better outcomes (Flap, 1989; Harrison, Montgomery, & Jeanty, 2019; Putnam, 1993b; Woolcock & Narayan, 2000). Meanwhile, the absence of social capital and connections have unfavorable consequences (Woolcock & Narayan, 2000). Bourdieu (1986), Coleman, (1988), Flap (1989), and Lin (2001) described social capital as a form of investment in achieving profits and returns by gaining access to more resources. Furthermore, Flap (1989) has emphasized that the investment in social capital must also be seen as investment in other assets since social capital packages other forms of capital. Utilizing social relations makes it feasible to access and mobilize more resources, thus, having a higher

possibility of achieving success and progress. The conceptual framework of the study is shown in Figure 3.

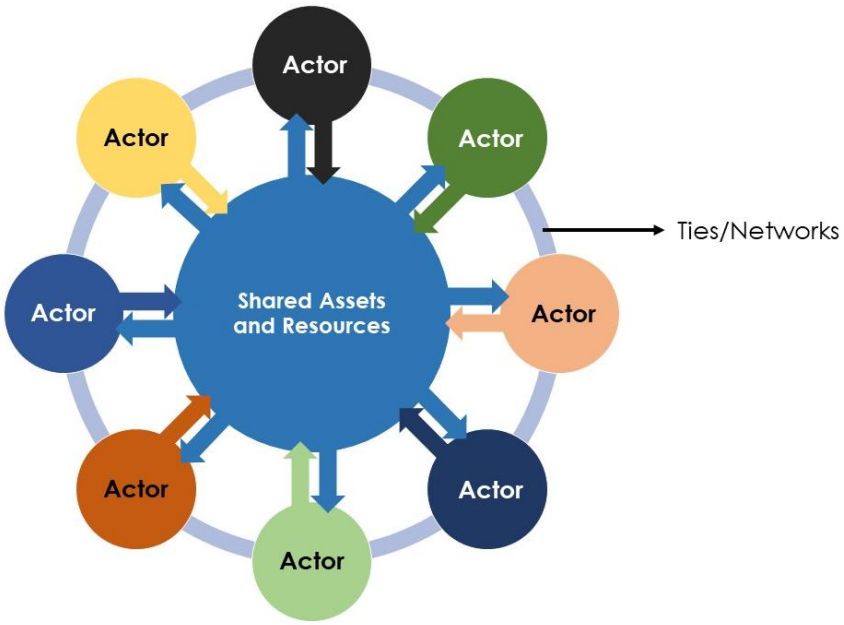


Figure 3. The concept of social capital.

3.2. Theoretical Framework

This study focuses on the impacts of participation in resource management to the development of the community and its local people, specifically social capital and people's livelihoods. The utility of social capital for the improvement of livelihoods is considered as an incentive that can motivate local people to actively and continuously participate in resource management projects. "[P]eople who are better equipped with social capital will be better able to attain their ends" (Flap, 1989). However, creating and maintaining social capital investments (Dasgupta et al., 2005), as well as the utilizing the social networks to gain benefits (Woolcock & Narayan, 2000), incur costs and require investments (Dasgupta et al., 2005; (Woolcock & Narayan, 2000).

This study further analyzed the impacts of social capital to the local people's livelihoods. Livelihoods, as defined by Farrington (2002), encompasses components beyond financial capital and income. He referred to livelihoods as "the capabilities, assets (stores, resources, claims and access) and activities required for a means of living." However, due to limitations, this study only covered the access to information and the access to services as variables that affect people's livelihoods. "Information is important in providing a basis for action" (Coleman, 1988). In addition, having access to information improves a person's opportunity for development, i.e. in seeking a job (Lin, 2001), typhoons and other disasters, *etc*. The access to services provides the support for the people to improve their overall capabilities and conditions, such as to improve their health, financial insurance, and literacy. Positive effects of participation and social capital to livelihoods includes improved people's motivation and positive perception in resource management projects; thus, improving their participation in the projects and increasing the possibility of the projects' success. The theoretical framework of the study is shown in Figure 4.

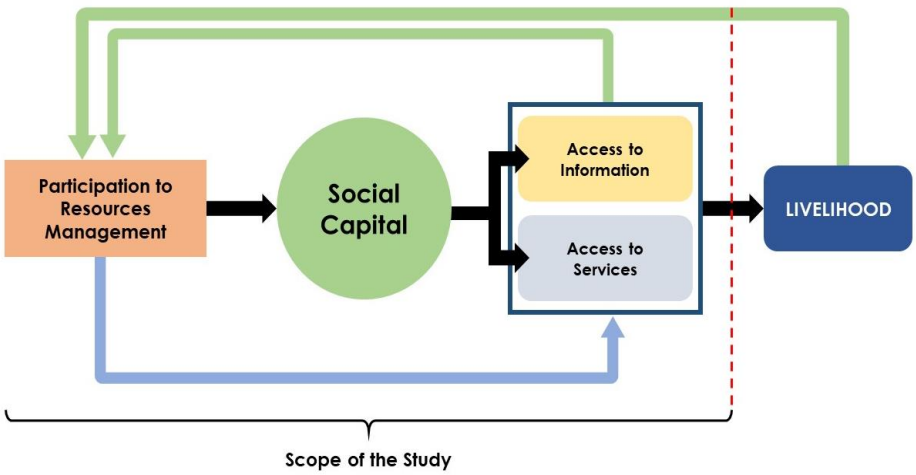


Figure 4. The theoretical framework on the role of social capital for improvement of livelihoods.

3.3. The Research Area and the Peoples Organization

The study was conducted in Brgy. (the abbreviation for Barangay, the smallest political unit in the Philippines) Alitas and Brgy. Binonoan in the municipality of Infanta in the province of Quezon. Infanta lies in the southern part of the main island of the Philippines, about 140 km away from Manila, the capital city. It is situated in the northern part of Quezon mainland lying along the coast of the Pacific Ocean facing the Polillo Island and straddles a portion of the Sierra Madre Mountains. It is comprised of 36 barangays with a total land area of 19 934.2717 ha including 10 817 ha of upland forests and 2 341 ha of mangrove forests (Local Government Unit of Infanta, 2013, 2018).

Brgy. Alitas and Brgy. Binonoan are among the 36 barangays of the municipality of Infanta. Both are classified as rural barangays and are clustered by the municipality under estuarine ecosystem with mangroves and Nipa swamps common in the area; Brgy. Alitas has 519.2 ha (320.06 ha under protection zone) of mangrove areas while Brgy. Binonoan has 460.2 ha (203.97 ha under protection zone). Both barangays also have forest lands within their political boundary with Brgy. Alitas having 353 ha while Brgy. Binonoan having 298 ha (Local Government Unit of Infanta, 2013, 2018).

Based from the 2016 national census, Brgy. Alitas has a total population of 1 308 people living in 279 households. Its population increased by 2.91% from 2011 to 2016. Meanwhile, Brgy. Binonoan has a total population of 1 885 people living in 356 households. The population growth rate from 2011 to 2016 is 2.63%. In both barangays, the main sources of income are jobs related to farming, forestry, and fishing, and being contracted as laborers and unskilled laborers (Local Government Unit of Infanta, 2013, 2018). Population and household data of the two barangays are presented in Table 3.

Table 3. Data on population and household size of the research areas.

	Population	Number of Families	Number of Household	Growth Rate (2011–2016)
Brgy. Alitas	1308	317	279	2.91%
Brgy. Binonoan	1885	448	356	2.63%

Both barangays are home to a People's Organization (hereinafter referred to as PO), Brgy. Alitas has the Alitas Farmers Association (AFA) while Brgy. Binonoan has the Binonoan Producers Cooperative (BIPCO). The two POs started as groups cooperating with a federation in Infanta to fight against private groups and individuals illegally taking over mangrove areas and converting it to fish ponds. These illegal activities had caused the decline of the fishes caught by the local people affecting their day-to-day livelihood since it is one of their main sources of income in the area. After that incident in 2013, both groups were formally formed as POs each handling their own projects in collaboration with the local government and different government agencies such as the DENR, Department of Agriculture (DA), Department of Tourism (DOT), and the Department of Trade and Industry (DTI).

The two POs have also been involved in reforestation and restoration projects. They took part in the National Greening Program (hereinafter referred to as NGP), a massive reforestation program under the Aquino Administration that aimed to plant 1.5 billion trees in 1.5 million-hectare lands in the country that started in 2011. Both organizations focused their reforestation and restoration projects in mangrove areas. They also created monitoring teams to guard their project areas from people who cut and harvest mangroves. Mangroves of Infanta were heavily used for its capacity to burn longer compared to ordinary timber resulting in massive deforestation of mangroves in Infanta. Making the problem worse is the wine industry in the province that still uses traditional method of winemaking—relying heavily on woods for cooking their wine. The wine distilleries use mangroves as a better alternative to woods. Furthermore, both People's Organization actively promotes the

use of rice hull as an alternative in for the mangroves as the main heat production material in wine production.

The AFA and BIPCO have also expanded their projects and government involvement outside environmental protection and restoration programs. Both POs are currently implementing projects that focus on livelihood development. Among these programs include wine distillery, sugar production from Nipa palms, and ecotourism development projects. The AFA has also started their mushroom production program in collaboration with the DTI, the DA, and the municipal government of Infanta. Meanwhile, the BIPCO had created their own winery store that produces *nipanog* (natural wine from Nipa) and red wine in partnership with the Southern Luzon State University (SLSU) and the Department of Science and Technology (DOST).

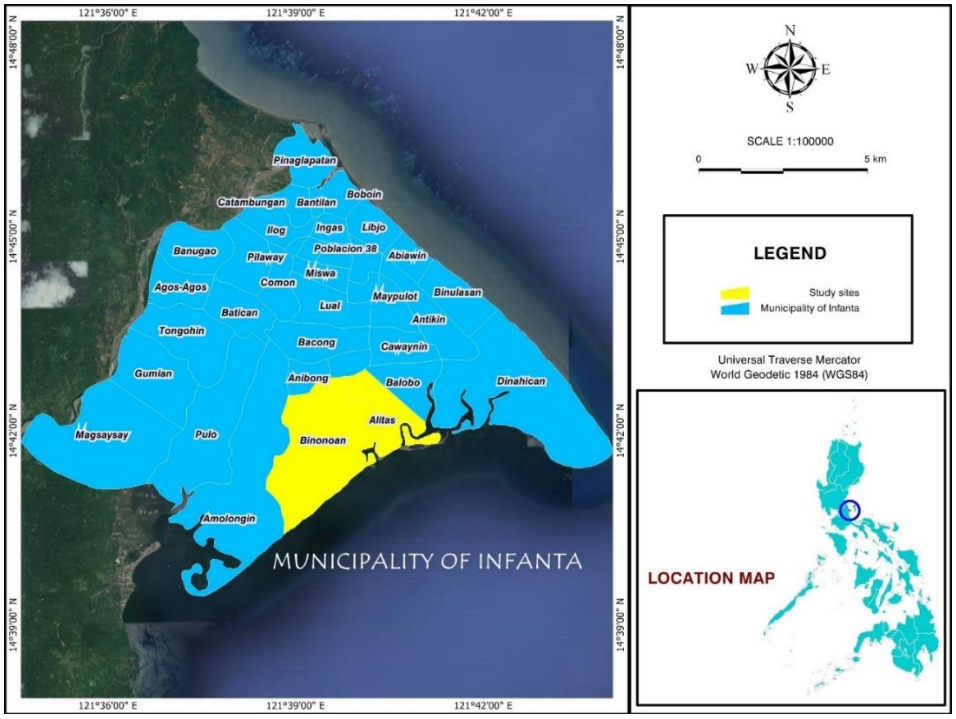


Figure 5. The location map of the research areas.

3.4. Data Collection

Face-to-face interview using a semi-structured questionnaire (Appendix 1) was the main mode of data collection for this research. In addition, key-informant interviews were carried-out for a more detailed discussion and for better understanding of the situations in the research areas. Reports provided by the POs, the barangay offices, the local government unit of the municipality of Infanta, and the DENR-Community Environment and Natural Resources Office of Real were used as sources for secondary data.

Preparatory meetings, consultations, and coordination were done during November 2018. The meetings were attended by government officials and selected residents of the two barangays. Free, prior, and informed consent was also confirmed during these meetings. Meanwhile, the actual data collection was conducted from the third week of December 2018 until the second week of January 2019. Face-to-face interviews were done with the support of hired enumerators. The enumerators were recommended by the barangay officials as well as the presidents of the POs and have prior experiences in conducting interviews. The enumerators underwent briefing and training from the research team about the questions in the survey and for the pointers in conducting the interview. Each of the questionnaires was checked and reviewed by the research team.

3.5. Sampling Method

The formula developed by Cochran (1953) was used to determine the representative sample size of households to be interviewed. Two formulas were used for the computation (1) the general formula to compute the sample size proportion; and, (2) the formula for the finite proportion correction for proportions (Israel, n.d.). Formulas are shown below.

$$n_o = \frac{Z^2 pq}{e^2} \quad (1)$$

where: n_o is the sample size
Z^2 is the abscissa of the normal curve that cuts off an area at the tails (1 − a equals the desired confidence level, e.g., 95%)
e is the desired level of precision
p is the estimated proportion of an attribute that is present in the population
q is 1 less p

For the computation of the sample size proportion, the confidence level was set at 95% and precision at ± 5%. Furthermore, it was assumed that p is at maximum variability (0.5). Z is equal to 1.96. Using the formula, and with the stated conditions, it was determined that the minimum number of samples to represent the population is 385 (n_o).

$$n = \frac{n_o}{1+\frac{n_o-1}{N}} \quad (2)$$

where: n is the sample size
n_o is the sample size proportion
N is the population size

There is a total of 635 households in the study area: 279 from Brgy. Alitas and 356 from Brgy. Binonoan (Local Government Unit of Infanta, 2018). From key informant interviews, it was determined that there are 88 members of the PO: 64 from Brgy. Alitas; and, 24 from Brgy. Binonoan. Therefore, the total size of the population not involved in mangrove restoration programs is 547. Applying the formula, it was determined that 226 households are needed to be interviewed for the study. Random sampling was used to select 226 non−member households from the two barangays. Meanwhile, all 88 members of the PO were interviewed. In total, 314 households were surveyed.

3.6. Measuring Social Capital

This research adopts theoretical definition of social capital as the embedded resources captured by building social relations

(Bourdieu, 1986; Carrillo Álvarez & Riera Romaní, 2017; Lin, 2001). This research also recognized the two components of the social capital theory proposed by Lin (2001): first, "resources embedded in social relations rather than individuals;" and secondly, the "access and use of such resources reside with actors." Furthermore, three main components were used to compute for the level of social capital, namely: ties, embedded resources, and trust. Ties covers Lin's first component of social capital while the embedded resources cover the second component. Trust emphasizes the significance of trust in social capital.

3.6.1. The Social Capital Formula

This research developed Formula 3 for the computation of the social capital. The computed value ranges from 0 to 1, where the values closer to 1 represents a higher level of social capital.

$$\text{Social Capital} = \boldsymbol{Ties\ Value \times Embedded\ Resources\ Value \times Trust\ Value} \quad (3)$$

It is important to point out that several respondents obtained a computed social capital value of 0, this however, does not reflect that these respondents do not have networks. In a general, social capital includes any form of social connections that includes neighbors, family, and friends. However, this research focuses on the social relations that has actual and potential impacts to people's livelihood; for this reason, not all social relations were covered.

3.6.2. Ties Value - covers the concept of social relations. Resources are captured through the establishment of connection with other individuals or groups (Lin, 2001). Without ties, there is neither a network nor social capital, thus, there would be no embedded resources. Ties value was computed using the Formula 4. The computed ties value ranges from 0 to 1, where values closer to 1 represent the higher merits.

$$\text{Ties Value} = \frac{\textit{Ties} + \textit{Diversity of Ties}}{2} \quad (4)$$ where;

a. *Ties* - the size of networks matter (Bourdieu, 1986; Kay, 2005) as the number of the ties and networks may represent sources of resources one can have access to (Bourdieu, 1986; Lin, 2001). The increase in the number of ties may also increase the collectively-owned resources the individual can access. Flap (1989) further elaborated that the number of ties represents the people and groups "prepared and are obliged" to provide help. To determine the number of ties, the respondents list all his organizations, associations, or companies they have connections. The number of ties is equal to the number of the respondent's affiliation. In this study, the highest number of ties of a respondent is 8 (the maximum actual number of ties).

$$\text{Ties} = \frac{\textbf{number of ties}}{\textit{maximum actual number of ties}} \quad (5)$$

b. *Diversity of the ties* - "a more diverse composition of ties is positive for the accumulation of social capital" (Teilmann, 2012). Each tie owns a particular kind of assets; consequently, a more diversified ties/networks creates access to a more diversified forms of resources and assets. Furthermore, the diversity of the ties represents the sources of information. Each tie was classified into five categories: (1) local association; (2) local businesses; (3) municipality level association; (4) professional association; and, (5) national level association. The diversity of the ties was measured by the number of different kinds of tie of each respondent. The maximum diversity of ties is equal to 5 since there are 5 classifications of ties.

$$\text{Diversity of the ties} = \frac{\textbf{different kinds of ties}}{\textbf{maximum diversity of ties}} \quad (6)$$

3.6.3. Embedded Resources Value - represents the actual and potential resources accessible to the respondents through their social relations. Embedded Resources Value was computed using Formula 8. Computed values range from 0 to 1, where values closer to 1 represent the higher merits.

$$\text{Embedded Resources Value} = \frac{GESM + AER}{2} \quad (7)$$ where;

a. *General economic status of the members (GESM)* - one of the key points on the definition of social capital proposed by Lin (2001) is the access to the resources embedded in the social relations. The amount of the resources possess by the individuals and groups in one's social relations is a major factor in one's social capital (Bourdieu, 1986) as these resources are the embedded resources they can potentially gain. GESM was measured through the respondent's perception on the amount of resources owned by the members of their social relations using a 5-level Likert scale: 1 - very low; 2 - low; 3 - average; 4 - high; and, 5 - very high. The max possible weight of the perceived resource ownership is equal to 5. General economic status of the members is represented by the sum of all the weight of resource ownership by the members of the respondents' social relations.

$$\text{GESM} = \frac{\frac{\Sigma \, weights \, of \, perceived \, resource \, ownership}{number \, of \, ties}}{max \, possible \, weight \, of \, perceived \, resource \, ownership} \quad (8)$$

This research assumes that people's perception about the economic status of members of their group reflects the ceiling of the resources they can have access or borrow. People's perception and the actual resources embedded on the members may have discrepancy; however, it can be argued that only those resources which are perceived to be owned by the members are the only resources people can have access to, but still depends on the discretion of the resource's owner. Without the knowledge that their members own the particular resources, individuals cannot access or borrow these resources.

b. *Access to the embedded resources (AER)* - this relates to the second component of the social capital concept of Lin (2001) and to social capability. Building ties with wealthy people and groups are not sufficient enough to impact a person's life, what truly matters is whether the person can access the resources embedded to the people and groups whom they established connections with. Mobilizing these resources could lead to development and the person's advancement (Lin, 2001). AER was measured using a 5-level Likert scale: 1 - very low; 2 - low; 3 - average; 4 - high; and, 5 - very high. Respondents were asked the level in which they can access and use the resources of their organizations and is owned by its members. The max possible weight of access to resources is equal to 5.

$$\text{AER} = \frac{\frac{\Sigma \textit{ weights of access to the embedded resources}}{\textit{number of ties}}}{\textit{max possible weight of access to resources}} \qquad (9)$$

3.6.4. Trust Value - Trust between actors is a requisite for working together; without it, cooperation and reciprocity may not exist (Coleman, 1988; Putnam, 2000; Teilmann, 2012). Trust is significant in building, strengthening, and maintaining social relationships. Consequently, in having no trust, there is a less possibility of (strong) engagement and networking; in turn, there is a less chance of creating opportunities and producing profits that go with the creation of social ties. Trust value was computed using Formula 12 with computed values ranging from 0 to 1 and those that are closer to 1 represents the higher merits.

$$\text{Trust Value} = \frac{\textit{Trust to the ties} + \textit{Participation to social ties}}{2} \qquad (10)$$ where;

a. *Trust to ties* - signifies the person's level of trust with his current ties. This represents the possibility to continue working and maintain his social relations. This was measured using a 5-level Likert scale: 1 - very low; 2 - low; 3 - average; 4 - high; and, 5 - very high. The max possible weight of current ties is equal to 5.

$$\text{Trust to the ties} = \frac{\frac{\Sigma \textit{ weights of trust to ties}}{\textit{number of ties}}}{\textit{max possible weight of trust to current ties}} \quad (11)$$

b. *Participation to social ties* - for partnership to function, both sides need to trust each other and to perform their responsibilities and obligations that will yield to reciprocity. In the expectation–obligation concept by Coleman (1988): "If A does something for B and trusts B to reciprocate in the future, this establishes an expectation in A and an obligation on the part of B. This obligation can be conceived as a credit slip held by A for performance by B." Following this analogy, the local people are obligated to actively participate in activities and projects of their social ties to extend trust between both parties. People's level of participation also reflects their dedication to their social ties to maintain the cooperation. This component was measured by the respondent's degree of participation in the activities and events of the ties and the groups they were involved. Respondents were asked to select one from four choices: (1) Does not attend on events and meetings; (2) Fair number of absences (average); (3) Present most of the time on events and meetings; and (4) Never absent at any events and meetings. The max possible weight of the trust by the ties is equal to 4.

$$\text{Participation to social ties} = \frac{\frac{\Sigma \textit{ weights of the participation to social ties}}{\textit{number of ties}}}{\textit{max possible weight of the trust by the ties}}$$

(12)

3.7. Data Analysis

3.7.1. Differences between participants and non-participants and between research areas

The study analyzed the differences between the participants and non-participants, and between the two research areas. For this purpose, Kruskal-Wallis Test, a non-parametric test, was performed to determine if there are significant differences between groups (Laerd Statistics, n.d.). Social capital, the components of social capital (ties value, embedded resources value, and trust value), as well as several socio-demographic variables (access to information, access to services, household size, educational attainment of the household head, and annual income) were all assessed using the Kruskal-Wallis Test.

3.7.2. Factors Affecting Social Capital

Tobit model was used to determine the factors affecting social capital. This model is the most frequently used model for censored data (Long, 1997). The social capital values, using the formula developed in this study, will result to values ranging from 0 to 1; hence, were treated censored data due to the presence of upper and lower boundaries. We regressed the computed values of social capital (dependent variable) against PO membership (dummy variable) and social-demographic factors (annual income, and the educational attainment of the household head) which were treated as the explanatory variables (Model 1). The variables used in the regression analysis are explained in Table 4.

$$Y_{SC\ Value} = \beta_0 + \beta_{PO} + \beta_{Education} + \beta_{Income} + u_i \quad \text{(Model 1)}$$

where: $Y_{SC\ Value}$ has a lower threshold of 0 and an upper threshold of 1.

3.7.3. Factors Affecting Access to Information and Access to Services

Factors affecting the people's access to information and access to services are some of the potential benefits people can gain from their participation in the mangrove restoration projects, and at the same time, can motivate them to continue their involvement in the project. In particular, the social capital was analyzed, whether it has significant impacts to these variables. Two linear regression models were developed for this purpose: access to information (Model 2); and, access to services (Model 3). Social capital, education of the household head, and the annual income were treated as the explanatory variables. The correlation matrix between variables used in the regression analysis is presented in Appendix 2 while the variables used in the regression analysis are explained in Table 4. Below are the specifications of the regression model:

$$Y_{Information} = \beta_0 + \beta_{SC\ Value} + \beta_{Education} + \beta_{Income} + u_i \quad \text{(Model 2)}$$

$$Y_{Services} = \beta_0 + \beta_{SC\ Value} + \beta_{Education} + \beta_{Income} + u_i \quad \text{(Model 3)}$$

Table 4. The variables used for the regression analysis.

Variables	Description	Reason for Selection of the Variable	Code
Social capital value	The quantified value of social capital computed using the formula developed in this study. Ties, embedded resources, and trust are the components of the social capital covered in the formula. The social capital value ranges from 0 to 1.	The study aims to determine the factors affecting social capital and its impacts to people's livelihoods. Previous literatures have identified social capital as a key factor for the development of a community (i.e. Avila-Foucat & Rodríguez-Robayo, 2018; Prayitno, Sari, & Putri, 2019). To verify a positive relationship between participation and social capital will provide empirical evidences that participatory resource management creates favorable conditions for the local communities in their development while addressing environmental concerns.	SC Value
Access to information	The people's access to different information (work related announcements, government and development programs, weather and disaster forecasts, etc.). Values range from 0 to 13.	Information provides the "basis for action" for people (Coleman, 1988). Information has been widely connected to social capital, specifically to social networks and ties (Granovetter, 1973; Lin, 2001). Networks and ties serve as channels that improves one's access to information (Kay, 2005). This study tests the impacts of the social capital to people's access to information as an extension of the incentives people gained from their participation in natural resources management.	Information

Access to services	The people's access to general services (health facilities, schools and universities, markets, financial and insurance institutions, etc.). Values range from 0 to 34.)	Access to the general services improves people's capabilities, conditions, and well-being. The study looks at the impacts of social capital to people's access to general services as an extension of the benefits people can get from their participation in natural resources management.	Services
PO membership (dummy variable)	Whether or not the respondent is a member of the PO. This variable represents the people's participation to resource management. (0 if not a member of the PO; and, 1 if a member of the PO).	Participatory approach is a common practice in resource management that addresses environmental and social concerns together (Agrawal & Gupta, 2005; Fox & Cundill, 2018). This variable was selected to test if participation in resource management improves the social capital of the local people. Studies of Damastuti & de Groot (2019) and Prayitno et al. (2019) concluded a positive relationship between participation and social capital.	PO
Annual income	The total annual income (PhP) of all members of the household.	Lee, Rianti, & Park (2017) had included income, among other individual characteristics, as a component of the internal factors that can affect social capital. The study of Lee et al. (2017) study also concluded a positive relationship between income and social capital. This variable was also selected as an explanatory variable to explain people's access to information and access to services.	Income

Education of the Household Head	The number of years of schooling of the household head.	Lee et al. (2017) has also included the education of an individual as a component under the internal factors that can affect social capital. This variable was selected, as an independent variable, to test the impacts of people' s educational background access to information and services.	Education

4. Results

4.1. Socio-Demographic Characteristics

Table 5 presents the demographic characteristics of the research areas of the study, Brgy. Alitas and Brgy. Binonoan. The two barangays have a total population of 3193, in which Brgy. Binonoan has more compared to Brgy. Alitas. In addition, there are 635 households in the two barangays, Brgy. Alitas having 279 while Brgy. Binonoan having 356.

A total of 314 households (88 are members of PO and 226 are non-members) were interviewed for the study, 147 resides in the Brgy. Alitas while 167 are from the other barangay and has an almost equal representation of males (159) and females (155). Mean age of the respondents is 46.77 and the average household size is 4.21. Most of the respondents earn less than PhP 60 000 or PhP 60 000 to PhP 119 999 per year (Figure 6). Annual income was categorized for the discussion of the demographic characteristics. With regards to the educational attainment of the household head, it is notable than less than half graduated from high and less than a quarter pursue a college degree (Figure 7).

Table 5. Demographic characteristics of the respondents.

	Brgy. Alitas	Brgy. Binonoan	Total
Population	1308	1885	3193
Total Number of Households	279	356	635
Number of PO Members	64	24	88
Number of Households interviewed	147	167	314
Gender of the Respondents			
1 – Male	65	94	159
2 – Female	82	73	155
Average Household Size	4.13	4.28	4.21
Average age of respondents	47.88	45.79	46.77

Annual income			
1 – Less than 60 000	61	97	158
2 – 60 000 to 119 999	55	48	103
3 – 120 000 to 179 000	20	12	32
4 – 180 000 to 239 999	6	5	11
5 – 240 000 to 300 000	4	2	6
6 – More than 300 000	1	3	4
Household Head Educational Attainment			
1 – Never attended school	1	0	1
2 – Elementary (not graduate)	6	15	21
3 – Elementary (graduate)	22	6	28
4 – High school (not graduate)	21	28	49
5 – High school (graduate)	67	76	143
6 – College (not graduate)	17	18	35
7 – College (graduate)	13	23	36
8 – Post graduate	0	1	1

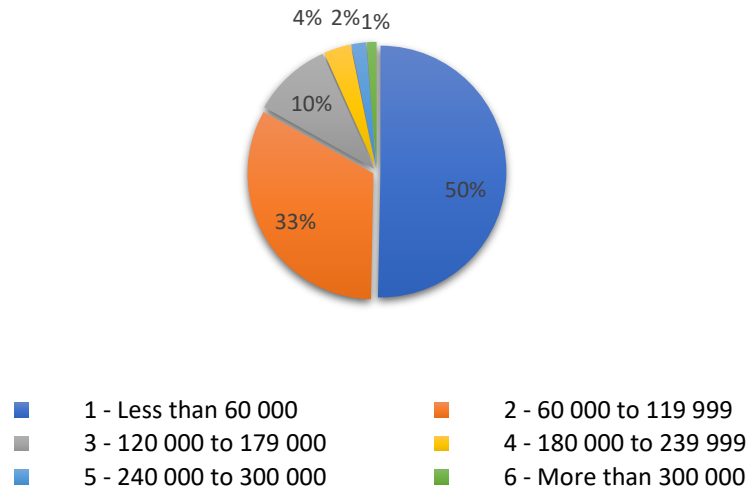


Figure 6. Annual income of respondents.

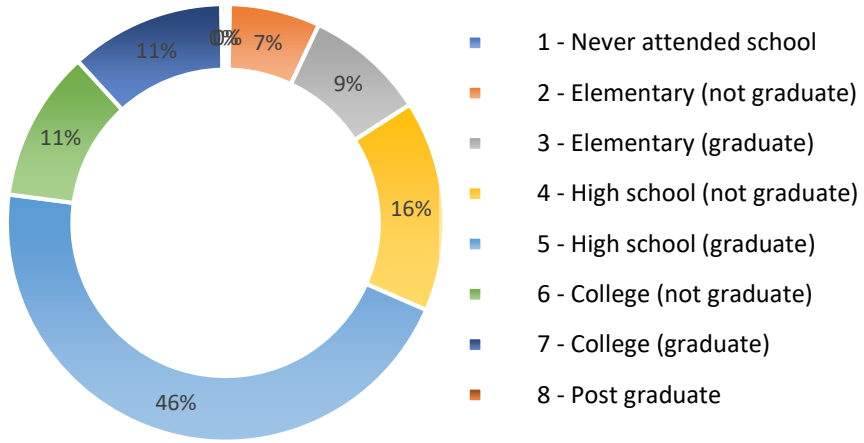


Figure 7. Educational attainment of the household head.

4.2. Descriptive Statistics

Table 6 and 7 present the summary of the descriptive statistics of the different variables covered in this study, by location and by PO membership, respectively. Kruskal–Wallis test was performed to compare between groups (location and PO membership). The results of the Kruskall–Wallis test indicate that there are statistical differences in the trust value, access to services, and access to information, with reference to location. Meanwhile, statistical differences were observed in social capital, ties, embedded resources, trust, access to resources, and access to information in relation to the membership to PO.

The tables further show that the overall social capital in of the respondents is 0.11 with the residents of Brgy. Binonooan edging the residents of Brgy. Alitas by a small margin. The main difference between the two locations with respect to the computation of the social capital value is having the statistical difference in the trust value, in which higher mean value was observed in Brgy. Alitas. Looking at the specific variables used in the formula developed for the computation of the social capital, there are statistical differences in the trust to ties and the

participation of the people to their social ties between the two locations, with the Brgy. Binonoan having higher values compared to the other barangay. Furthermore, it was also determined that a significant difference exists in terms of annual income between the two research locations. With regards to PO membership, all variables of the social capital have statistical differences with those members of the PO having higher mean values than to those who are non-members. The same trend can be observed with the access to services and the access to information.

Table 6. Descriptive statistics of the sampled households by locations.

Variable	Total Samples (n=314)	Location								
		Brgy. Alitas (n=147)				Brgy. Binonoan (n=167)				Kruskal–Wallis
		Mean	SD	Min	Max	Mean	SD	Min	Max	(p–value)
Social Capital Value	0.11	0.11	0.1200	0	0.4990	0.12	0.1352	0	0.6464	0.9296
[a] Ties Value	0.22	0.25	0.2439	0	0.8667	0.2	0.1929	0	0.8917	0.3942
[a] Embedded Resources Value	0.46	0.43	0.3077	0	0.96	0.49	0.3442	0	1	0.1851
[a] Trust Value	0.53	0.48	0.3348	0	0.935	0.58	0.4006	0	1	3.72E–05*
Access to Services	18.09	21.55	6.6992	8	31	15.04	4.4962	3	29	< 2.2e–16*
Access to Information	8.34	10.4	2.4204	3	13	6.53	2.7304	3	13	< 2.2e–16*
Household Size	4.21	4.13	1.5451	1	10	4.28	1.7823	1	11	0.5322
HH Head Education (Years)	4.8	4.7	1.2682	1	7	4.89	1.3534	2	8	0.1962
Annual Income (PhP)	73,937.04	83,725.47	62066.74	16500	366000	65,320.89	60926.89	10000	360000	5.03E–05*
[b] Number of Ties	0.22	0.27	0.2823	0	1	0.18	0.1851	0	0.875	0.0307*
[b] Diversity of the ties	0.24	0.24	0.1944	0	0.6	0.23	0.2078	0	0.8	0.3698
[b] Types (Bonding or Bridging)	0.21	0.25	0.2751	0	1	0.18	0.1989	0	1	0.398
[c] General economic status of the members	0.45	0.43	0.3195	0	1	0.48	0.3443	0	1	0.5376
[c] Access to the embedded resources	0.47	0.44	0.3174	0	1	0.5	0.3544	0	1	0.06336

[d] Trust to ties	0.53	0.46	0.3268	0	1	0.58	0.4078	0	1	0.0001*
[d] Participation to social ties	0.54	0.49	0.3541	0	1	0.58	0.4122	0	1	0.0015*

* - has statistical differences (Kruskal–Wallis).

[a] - Variables used for the computation of social capital value.

[b] - Variables used for the computation of ties value.

[c] - Variables used for the computation of embedded resources value.

[d] - Variables used for the computation of trust value.

Table 7. Descriptive statistics of the sampled households by PO Membership.

Variable	Total Samples (n=314)	Participation								
		Non-PO Members (n=226)				PO Members (n=88)				Kruskal-Wallis
		Mean	SD	Min	Max	Mean	SD	Min	Max	(p-value)
Social Capital Value	0.11	0.06	0.0673	0	0.3119	0.26	0.0148	0.0337	0.6464	< 2.2e-16*
[a] Ties Value	0.22	0.11	0.1135	0	0.4679	0.5	0.1798	0.1321	0.8917	< 2.2e-16*
[a] Embedded Resources Value	0.46	0.38	0.3442	0	1	0.67	0.1316	0.3667	1	1.15e-11*
[a] Trust Value	0.53	0.46	0.4115	0	1	0.72	0.1246	0.425	1	3.72E-05*
Access to Services	18.09	16.77	6.2709	7	31	21.47	5.8545	3	31	< 2.2e-16*
Access to Information	8.34	7.32	3.0532	3	13	10.97	1.9325	5	13	< 2.2e-16*
Household Size	4.21	4.18	1.6991	1	11	4.27	1.6169	1	9	0.5322
HH Head Education (Years)	4.8	4.85	1.3101	2	8	4.67	1.3280	1	7	0.3406
Annual Income (PhP)	73,937.04	72,628.46	60665.82	10000	366000	77,297.73	65711.28	18000	318000	< 2.2e-16*
[b] Number of Ties	0.22	0.13	0.1021	0	0.375	0.52	0.2217	0.125	1	< 2.2e-16*
[b] Diversity of the ties	0.24	0.2	0.1417	0	0.6	0.47	0.1380	0.2	0.8	< 2.2e-16*
[b] Types (Bonding or Bridging)	0.21	0.1	0.1035	0	0.4286	0.51	0.2359	0.0714	1	< 2.2e-16*
[c] General economic status of the members	0.45	0.37	0.3451	0	1	0.67	0.1627	0.2	1	4.47E-12*
[c] Access to the embedded resources	0.47	0.39	0.3561	0	1	0.68	0.1459	0.4	1	9.04E-10*

[d] Trust to ties	0.53	0.45	0.4087	0	1	0.73	0.1397	0.4	1	1.44E−06*
[d] Participation to social ties	0.54	0.47	0.4265	0	1	0.72	0.1650	0.0714	1	0.0011*

* - has statistical differences (Kruskal−Wallis).

[a] - Variables used for the computation of social capital value.

[b] - Variables used for the computation of ties value.

[c] - Variables used for the computation of embedded resources value.

[d] - Variables used for the computation of trust value.

4.3. Statistical Results

4.3.1. Social Capital

Social capital was regressed to PO membership, annual income, and educational attainment of the household head using Tobit regression. The result indicated that being a member of the PO is a significant factor that affects the social capital; other independent variables have no significant effects on social capital (Table 8). The result of the Kruskal–Wallis test corroborates the result of the regression analysis which indicated that there are significant differences in social capital and in other variable related to social capital between members and non–members of the PO. These findings support the first hypothesis of the study that participation in natural resource management improves social capital.

Table 8. Tobit regression model for estimating social capital (Model 1).

	Estimate	Std. Error	z value	Pr(>|z|)
(Intercept):1	1.213e−02	2.083e−02	0.582	0.561
(Intercept):2	−2.142e+00	4.861e−02	−44.060	<2e−16 ***
PO1	2.244e−01	1.510e−02	14.863	<2e−16 ***
Educ Years	1.625e−03	2.136e−03	0.761	0.447
Annual Income	2.380e−08	1.144e−07	0.208	0.835
Names of linear predictors: mu, loglink(sd)				
Log−likelihood: 86.4883 on 623 degrees of freedom				
Number of Fisher scoring iterations: 8				
No Hauck−Donner effect found in any of the estimates				
R squared: 0.4708273				
Significant codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1				

4.3.2. Access to information and access to services

Linear regression was employed to determine the factors affecting the access to information and access to services. The dependent variables were regressed to social capital, as well as to the educational attainment of the household head, and annual income. The results of the regression modelling indicated that social capital and annual income are significant factors affecting

the access to information and access to services (Table 9 and 10). The results support the second hypothesis of this study that the increase in social capital improves people's access to information and to services; thus, improving the conditions of the local communities. Furthermore, integrating the results of the three regression models affirms that participation in natural resource management produces opportunities for the local communities. For Model 2, the normality assumption of the regression was not met; however, the large sample size of the study makes the regression results valid and credible as explained in the central limit theorem (Bartlett, 2013; Lumley, Diehr, Emerson, & Chen, 2002).

Table 9. Linear regression model for estimating access to information (Model 2).

	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	0.3340946	0.1573356	2.123	0.034508 *
SC Value	0.0493800	0.0111618	4.424	1.34e−05 ***
Educ Years	−0.0001844	0.0030743	−0.060	0.952207
Annual Income	0.1310399	0.0333970	3.924	0.000107 ***

Residual standard error: 0.1799 on 310 degrees of freedom
Multiple R−squared: 0.1056
Adjusted R−squared: 0.0969
F−statistic: 12.2 on 3 and 310 DF
p−value: 1.443e−07

Significant codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Table 10. Linear regression model for estimating access to services (Model 3).

	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	0.887786	0.135294	6.562	2.23e−10 ***
SC Value	0.045233	0.009598	4.713	3.70e−06 ***
Educ Years	−0.003019	0.002644	−1.142	0.25442
Annual Income	0.091088	0.028718	3.172	0.00167 **

Residual standard error: 0.1547 on 310 degrees of freedom
Multiple R−squared: 0.09709
Adjusted R−squared: 0.0884
F−statistic: 11.11 on 3 and 310 DF
p−value: 6.016e−07

Significant codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

5. Discussion

Rewards and compensations are necessary to be provided to those who participates in resource management projects. These benefits motivate people to actively engage and to continue their participation in the projects (Agrawal & Gupta, 2005; Paudyal et al., 2018; Sirivongs & Tsuchiya, 2012). It is worth noting that the rewards that can motivate people are not only limited to financial and other tangible incentives, but also covers intangible benefits (Grillos, 2017) such as the improvement in human and social capitals. This concept has also been applied to community-based resource management strategies, notably cases are in PES projects (Jones set al., 2019; Moros, Vélez, & Corbera, 2019). The results of this study may serve as an empirical evidence in the growing interest of using intangible benefits, social capital in particular, as incentives to stimulate stronger participation from the local communities in resource management.

5.1. Impacts of participation to social capital

The results of this study support the findings of (Damastuti & de Groot, 2019; Prayitno et al., 2019) that social capital is positively influenced by participation. The most perceivable impact of participation can be observed in the difference in the amount of external social relationships between the participants (PO members) and the non-participants (non-PO members). The PO members have established connections and partnered with different government organizations such as the DA, DTI, and DOT as a result of their collaboration with the DENR in the mangrove restoration project. Dasgupta, Putnam, & Dasgupta (2005) have described this as building of indirect links-the links that people can establish by means of their existing ties and networks. The accomplishments and the performance of the POs in the mangrove restoration project, and in their previous involvements, have also raised the opportunities for them to collaborate with other external organizations. Both POs were awarded as top performing organizations for the NGP-a massive

national-level reforestation project in the Philippines that started in 2011. Awards may serve as proofs and recognitions that strengthen trusts by the external organizations, enabling the possibility of continuously working together and to be involved in future projects (Lin, 2001; Teilmann, 2012). The repeated interaction between the POs and the government can also further the trust between each party leading to more positive collaborations (Dasgupta et al., 2005; Fukuyama, 2001).

Participation and collaboration with external organizations also improve the trust within the community, thus, strengthening the bonding social capital (Morris et al., 2019). Consultations, deliberations, and open discussions are usual practices in the decision-making process in the participatory management that allows communication between the members of the community as well as with external organizations and enables the sharing of information and the exchanges of ideas (Baker & Chapin, 2018; Johnston & Lane, 2018; Morris et al., 2019). Regular monitoring and evaluation activities are part of the regular operations of the DENR to check and assess the deliverables and targets of their partner POs in managing forest and other natural resources under their jurisdiction. Discussions, meetings, and dialogues are part of these activities, in which attended not only by the PO members, but also with the other stakeholders, and residents of the barangays. These allow the different groups and individuals to express their views and stands on matters related to such activities; thus, improving support and trust even from the non-PO members. Willis (2012), focusing on Elinor Ostrom's researches on common pool resources, have also emphasized the importance of face-to-face communication in strengthening trust and the cooperation of people. Furthermore, communications also stimulate social learning (Schröter, Hauck, Hackenberg, & Matzdorf, 2018; Semitiel-García & Noguera-Méndez, 2019) that can "influence people's opinions and views through the transmission of information and deliberation of ideas" and the acceptance of a common goal shared by the community members (Schröter et al., 2018).

Social capital as defined by Bourdieu (1986), Lin (2001), and Portes, (1998), are the resources embedded in social relations that can be used as assets to improve one's condition. This study argues that participation in resource management

increases the social capital by increasing the amount of social ties and networks of the local people. The survey results also support this argument in which those who participates (the PO members) have higher ties value and embedded resources value compared to those who do not participate in resource management (the non-PO member). Furthermore, the PO members also put higher trust and engage more in the activities of their partner organizations. This substantiates the claims of Agrawal & Gupta (2005), Cuenca, Robalino, Arriagada, & Echeverrı (2018), and Moukrim et al., (2019) that people participate more in resource management when they are receiving incentives. Moreover, the successful participation of the POs in NGP and other projects based in their areas have further resulted for them to be recognized by their communities. Non-PO residents as well as the village council, have acknowledged the two organizations on their role in the protection and conservation of the environment. Residents of the two barangays generally trust the POs not only as environmental stewards but also in conflict resolution as well as being credible sources of information.

5.2. Social capital and access to information

This study supports the findings of previous researches by Franzel (2002), Kiptot & Franzel (2012), and Sanou, Savadogo, Ezebilo, & Thiombiano (2019) that financial capital, measured in terms of annual income in this study, is a significant factor in people's access to information. Households with limited financial assets endure social constraints and generally have lower literacy compared to wealthier households. These limitations, coupled with other barriers, compromise the poor to access information and to utilize technical knowledge (Kiptot & Franzel, 2012). Semitiel-García & Noguera-Méndez (2019) had proposed an alternative for this predicament: to implement capacity building activities that can improve people' s skills and experiences; and, to involve them to different undertakings to broaden their knowledge. This will heighten the chances of the poor to be involved in other projects as some may require experience and a minimum level of knowledge to be able to participate.

The result of the regression modelling has also indicated that social capital is a significant factor of people's access to information. Social relations are sources of resources, as well as information (Bourdieu, 1986; Lin, 2001); accordingly, the density of people's social ties and networks affects the diversity and the sources of information people can access (Coleman, 1988; Lin, 2001; Saffer, 2016). Lin (2001) has also emphasized that social ties "activate[s] chains of multiple actors," which entails that a person's social network can be utilized as an extended network by his other social connections. Building on Lin's argument on social relations, those who have denser and more diverse networks have more opportunities in acquiring information. PO members, as they had established connections with other external organizations in the regional- and national-level as a result of the partnership with the DENR and the local government, have gained a better access to more sources and more diverse information. The diversity of the POs' networks can be reflected in their ties with different agencies that concerns in different fields and sectors. Dasgupta et al. (2005) and Granovetter (1973) have also highlighted this point as they had recognized the significance of the external social relations in comparison with the bonding social capital. Bridging social capital are sources of diverse and "non-redundant" information that facilitates development and progress (Hamilton & Lubell, 2019). Higher social capital also enables the reduction of transaction cost to (Flap, 1989; Fukuyama, 2001; Woolcock & Naraysan, 2000) making it easier to obtain information. POs' connections with government agencies and other external organizations has allowed them to access wide range of information and through a faster route since they have direct contacts to different external organizations as a result of their partnerships to different projects

Higher social capital also facilitates "good information flow" (Nardone et al., 2010), conversely, those having inadequate social capital can be characterized having scarce information (Kay, 2005). Trust, a key component of social capital, is a crucial factor towards a productive cooperation. A higher level of trust between the community and external organizations, as well as within the community, allows a better flow of knowledge and in acquiring new ideas and technologies (i.e. Abid, Ngaruiya, Scheffran, & Zulfiqar, 2017; Shah, Zhou, &

Shah, 2019). PO members exhibit a higher level of trust to their organizations and are more active in participating in the events and activities hosted by these organizations. This allows the PO members to have a better cooperation with their organizations and its members enabling more information and knowledge sharing.

5.3. Social capital and access to services

Public services are provided for the improvement of people's well-being, as well as for their convenience. There are two standard ways to enjoy these services: (1) by having the resources (normally in terms of financial assets) for payments; or, (2) by availing the services provided by the government as assistance for those financially-incapable. The result of the study indicates that income and social capital are identified as significant factors that affect access to services.

The higher the financial capability of a person, the more services he can access. If freedom can be viewed as people's opportunities, as argued by Sen (1999), then a person's financial capability reflects his freedom to get access to more services. Furthermore, a higher financial capability allows a person to select which services he can avail. For example, in the Philippines, rich people often will go to a private hospital than a government hospital because of better equipment and facilities, and a more ideal patient-to-doctor ratio. The respondents in this study possess limited amount of assets, including the level of their financial wealth as reflected in their annual income. This condition has forced them to rely on government programs and initiatives to have access to different services.

The higher social capital of the PO members, as a result of their engagement with the DENR in environmental projects, have allowed them to enjoy the access to more services through utilization of social networks to create of indirect links (Dasgupta et al., 2005). A higher social capital, as a result of the POs' participation to environmental projects have produced positive snowball effects and led for the PO members to be involved in livelihood programs that increases their income and diversified

their livelihood sources. The POs and its members are partners to several development programs that include the "Infantagay" Project–local traditional wine (*lambanog* and *nipanog*) and red wine making of the SLSU; ecotourism projects that centers with the three tourist–popular municipalities of Real, General Nakar, and Infanta of the DOT; sugar production from Nipa of the DTI; milkfish aqua–farming project and mushroom propagation project of DA; and the NGP forest and mangrove reforestation and restoration projects of the DENR. Furthermore, the increase in the level of income also improves one's capabilities to access more services such as for education and insurance. In terms of financial sources, especially during times of emergencies, the POs have established a revolving fund which can be borrowed by their members. This financing scheme is easier to access since it does not require collaterals unlike other formal financing institutions. The same result was concluded by McGrath et al. (2018) in their study in which they had observed that participants of PES projects can easily borrow money from their group which does not require collateral compared to the non–participants of the project.

This study also features "Palakasan/Padrino" system which is common in the Philippines. It is a "value system where one gains favor, promotion, or political appointment through family affiliation (nepotism) or friendship (cronyism), as opposed to one's merit" (ReddVi, 2017). POs, as they have already proven with their accomplishments and recognitions, were favored be collaborators of development programs. Although this portrays biasness and undermines the equality of the selection process, it adds to the assurance that the objectives and deliverables of the programs can be achieved because of the good track record of the POs. This system was also explained implicitly by Lin (2001) as one of the advantages of social capital.

6. Conclusion

6.1. Summary and Key Findings

The output of this study can contribute to empirical evidences for the sustainable management of forest resources. This study and the research problem were framed based from two propositions: first, there is a cause–effect relationship between the environment and social component, therefore, resource management strategies should cover both aspects in able to achieve sustainability; and, second, the importance of providing benefits to local people who participate in resource management as these benefits motivate them to continue their engagement in the participatory management. Focusing in the second proposition, intangible benefits such as social capital, has "windfall" effects that can serve as rewards to people for their participation.

The results of this study suggest that people's participation can make natural resource management be more beneficial for the local people as it can improve their livelihoods. Their participation increases social capital, consequently, improving the access to information and access to services. In general, the increase in social capital reflects to the increasing density and diversity of social relationships the local people have, and a more positive recognition and trust to their community. In addition to that, the improved access to information and access to services allows a more favorable conditions towards progress and development. These conditions, coupled with the other benefits of participation, create sustainable opportunities for the community and its people to increase their assets and capitals, hence, putting lesser pressure to the environment as people's main source of resources for their needs and subsistence.

The results of the study may contribute to the improvement of resource management given that the managers are informed of the findings of this study. Local participation brings more than just tangible benefits but intangible benefits as well. These intangible benefits, social capital, access to information, and access to services in the case of this study,

although have less direct impacts, may produce more sustainable and long-term gains. Moreover, these benefits can promote and strengthen the participation of local communities in resource management creating a better condition to solve deforestation and forest degradation problems. The results also justify the participatory forest management in which the objectives are to contribute to environmental sustainability and accounting to people's social concerns.

6.2. Issues Remaining and Suggestions for Further Studies

1. Unit of Observation

It may be advisable to conduct a study between communities with and without organized group that participates in resource management to discern the impacts of participation to social capital in the community level. This study was conducted in two adjacent communities, both having an organized group (the PO) that participates in mangrove restoration projects, using household as the unit of observation. The two POs share information and contacts with one another group. Most of the PO members, regardless of what PO they belong, have almost the same social ties and networks.

2. Measurement of Social Capital

It may also be appropriate to include other components of social capital in future researches. The computation of the social capital value in this study only focused on three main components: ties, embedded resources, and trust. Although these three are considered the most important elements of social capital, its context is not limited to these three. Furthermore, there is no universal formula for the computation of social capital. It is still a challenge to come up with a generally accepted social capital formula.

3. The Focus on Bridging Social Capital

Although this study covered both bonding and bridging social capital, higher merits were given to bridging social capital than the other type. It is however necessary to point-out that bonding social capital is also an important factor for the improvement and development of individuals and groups; especially for in stimulating cooperation within the community (Hamilton & Lubell, 2019). It is therefore improper to neglect bonding social networks when tackling topics related to social capital.

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9. Appendices

Appendix 1. The correlation matrix between the variables used in the regression analysis.

	PO	SC Value	Education	Income	Information	Services
PO	–	0.6902	−0.0628	0.0339	0.5076	0.3250
SC Value	0.6902	–	0.0024	0.0469	0.3778	0.2384
Education	−0.0628	0.0024	–	0.2767	0.0168	−0.0529
Income	0.0339	0.0469	0.2767	–	0.1693	0.1721
Information	0.5076	0.3778	0.0168	0.1693	–	0.6232
Services	0.3250	0.2384	−0.0529	0.1721	0.6232	–

Appendix 2. The interview questionnaire

Respondent No. ☐☐ - ☐☐☐

SEOUL NATIONAL UNIVERSITY
College of Agriculture and Life Sciences
Department of Forest Sciences

Part I. Demographic Characteristics

1. **Name:** _____

2. **Age:** ☐☐ 3. **Gender:** *1 – Male* *2 – Female*

4. **Household size:** ☐☐

5. **Household members (Please indicate the Household Head by putting "HH" after his/her name.):**

	Code	Family Role	Name (Optional)	Gender	Age
	A	Father			
	B	Mother			
Other household members	C				
	D				
	E				
	F				
	G				
	H				
	J				
	K				

4. **Educational Attainment:** *1 – Never attended school* *2 – Elementary (not graduate)* *3 – Elementary (graduate)* *4 – High school (not graduate)* *5 – High school (graduate)* *6 – College (not graduate)* *7 – College (graduate)* *8 – Post graduate*

5. **Civil status:** *1 – Single* *2 – Married* *3 – Separated* *4 – Live-in* *5 – Widow/Widower*

6. **Indigeneity:** *1 – Both parents are IPs* *2 – One of the parents is IP* *3 – None of the parents is IP*

7. **Mobility pattern:** *1 – Native/Born-resident* *2 – Migrant*

If Migrant:

a. **Place of Origin:** _____

b. **Reason for migration:**
1 – Occupational/Work-related *2 – Marriage/ Matrimonial reason*
3 – Improvement of security *4 – Availability of land for cultivation*
5 – Evicted from land *6 – Displaced due to natural calamities*
7 – Government Program *8 – Others, specify:* _____

8. **Length of stay in the area (no. of years):** *1 – less than 5 years* *2 – 5-10 years* *3 – 11-15 years* *4 – 16-20 years* *5 – more than 20 years*

9. **Source of income:**

Refer to this list for items 9.
- Farming and agriculture
- Fishing
- Forestry products
- Non-Timber Forestry Products (Buri, Honey, etc)
- Business (ex. Sari-sari store, equipment rentals)
- Working in office/cities
- Hired laborer (Carpenter, mason, etc.)
- Professional work

	Source of income	Monthly Income (PhP)	Annual Income (PhP)
Primary			
Secondary			
Tertiary 1			
Tertiary 2			
Tertiary 3			
		TOTAL	

10. **Availability of job/s and livelihood/s all year for family members.**
1 – No job all year *2 – Have job/s 1-4 months* *3 – Have job/s 5-8 months* *4 – Have job/s 9-11* *5 – Have job/s all year*

Part II. Networks and organizations

4. **Please indicate the organizations and influential individuals your household members are affiliated. Please fill-up the table below based on the possible answers provided.**

   A. **Type of organization**

   B. **Name of organization or influential individual.** Please write the complete name of the organization. In case of influential individual, please write the name.

   C. **General economic status of members**
   1 – Very Low *2 – Low* *3 – Average* *4 –High* *5 – Very High*

   D. **Number of members of the organization**
   1 – less than 50 *2 – 50-100 people* *3 – more than 100* *4 – national level*

   E. **Access to and use of the resources provided by the organization or individual**
   1 – Very Low *2 – Low* *3 – Average* *4 –High* *5 – Very High*

   F. **Do the resources/services provided by the organization/ individual improve your overall well-being?**
   1 – No, not at all *2 – Yes, but only small improvement*
   3 – Yes, it somehow improves our well-being *4 – Yes, it greatly improves our well-being*

A. Type of organization	B. Name of organization or influential individual	C. General economic status of members	D. Number of members of the organization	E. Access to and use of the resources provided by the organization or individual	F. Impacts of resources to improve your overall well-being
Environmental Group (Bantay Gubat)					
People's Organization					
Farmer/Fisherman group or cooperative					
Finance, credit, savings group, cooperatives					
Traders or Business Association					
Professional Association					
Trade Union or Labor Union					
Neighborhood/ Village committee					
Religious or spiritual group					
Political group or movement					
NGO or civic group (Rotary Club, Red Cross)					
Women's group					
Education group (parent-teacher assoc.)					
Other groups (Health, Sports, Youth, etc.)					
Government Offices (DENR, DA, BFAR, etc.)					
Academic Institutions (SUCs, private schools)					
Influential individuals you have connections (politician, businessmen)					

4. **Social Capital Index.**

   A. **Name of Organization and Influential Individual –** the organizations and influential individuals your household members have affiliations. Please refer to item No. 11.

   B. **Reciprocity – Will your organizations provide help/assistance in time of needs and troubles?**
   1 – Definitely NO.
   2 – Yes, but only to some extent.
   3 – Yes, they will help most of the time.
   4 – Definitely YES. They will always provide help and assistance.

   C. **Trust – Trust with the members of the group.** Do you have trust in your group?
   1 – Very Low 2 – Low 3 – Average 4 –High 5 – Very High

   D. **Cohesion – the strength of unity of your group.** Do you think the members in your group are united to attain a common goal?
   1 – Very Low 2 – Low 3 – Average 4 –High 5 – Very High

   E. **"Diversity" – organizational belongingness of the ties.**
   1 – local association 2 – local businesses 3 – municipality level association
   4 – Professional association 5 – National level association

   F. **Types (bonding, bridging, linking)**
   *1 – **BONDING (homogenous group)** - membership depends on having the same community or gender or profession or political party or interest or job or hobby…*
   *2 – **BRIDGING (heterogenous group)** - membership regardless of the community or gender or profession or political party or interest or job or hobby…*

   G. **Degree of participation**
   1 – Does not attend on events and meetings 2 – Fair number of absences (average)
   3 – Present most of the time on events and meetings 4 – Never absent on events and meetings

	A. Name of Organization and Influential Individual (Please refer to No. 11)	B. Reciprocity	C. Trust	D. Cohesion	E. Diversity	F. Types of Ties	G. Degree of Participation
1							
2							
3							
4							
5							
6							
7							
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
TOTAL							

5. **What is the main BENEFIT from joining groups/organizations?**
   1 – Improves my household's current livelihood or access to services
   2 – Important in times of emergency/in future
   3 – Benefits the community
   4 – Enjoyment/Recreation
   5 – Spiritual, social status, self-esteem
   6 – Other (specify): _____

6. **What is the main CONSIDERATION for joining groups/organizations?**
   1 – Improves my household's current livelihood or access to services
   2 – Important in times of emergency/in future
   3 – Benefits the community
   4 – Enjoyment/Recreation
   5 – Spiritual, social status, self-esteem
   6 – Other (specify): _____

4. **If a community project does not directly benefit you, but has benefits for many others in the village/neighborhood, would you contribute TIME to the project?**
   1 – NO, I will not *2 – YES, I will*

5. **If a community project does not directly benefit you, but has benefits for many others in the village/neighborhood, would you contribute MONEY to the project?**
   1 – NO, I will not *2 – YES, I will*

6. **Overall, how would you rate the spirit of participation in this village/neighborhood?**
   1 – Very Low *2 – Low* *3 – Moderate* *4 – High* *5 – Very High*

Part III. Access to Resources and Services

7. **Access to Resources. Please indicate the three most important resources by marking asterisk (*) on the "Remarks" column.**

	Resources	Access *0 – No 1 – Yes*	Supply and/or Satisfaction *1 – Very Low 2 – Low 3 – Moderate 4 – High 5 – Very High*	Specify the Product/s and Remarks
A	Foods			
B	Clean water			
C	Forest			
D	Timber resources			
E	Non-timber forest products (Buri, Honey, etc.)			
F	Mangroves and related resources			
G	Water resources, fishes, and other sea foods			
H	Fuelwoods (timber and mangrove)			
I	Products produced outside the community			

8. **Access to Services Please indicate the three most important services by marking asterisk (*) on the "Remarks" column.**

	Services	Access *0 – No 1 – Yes*	Supply and/or Satisfaction *1 – Very Low 2 – Low 3 – Moderate 4 – High 5 – Very High*	Specify the Product/s and Remarks
A1	Elementary School			
A2	High School			
A3	University and state college			
A4	Vocational Schools			
A5	Training centers			
A6	Scholarships			
B1	Hospitals and health facilities			
B2	Pharmacy			
B3	Botika ng Barangay			
C1	Banks			
C2	Cooperative			
C3	Microfinances, lending			
C4	Pensions			
C5	Insurances			
C6	Financial support (example: 4Ps)			
D1	People's organizations			
D2	Labor groups			
D3	Women's organizations			
D4	Senior citizen organization			
D5	Religious buildings and organizations			
E1	Markets			
E2	Producers and traders			
F1	Communication facilities, cellphone signals			
F2	Cemented roads			
F3	Government offices (DENR, DA, DILG, etc.)			

F4	Police and military		
F5	Transportation services		
F6	Computers and internet		
G1	Electricity		
G2	Irrigation		
H	Recreational places/facilities		

PART IV. Information

4. **Access to information. Please indicate the three most important types of information by marking asterisk (*) on the "Remarks" column.**

	Type of Information	Access *0 – No* *1 – Yes*	Amount, Supply and/or Satisfaction *1 – Very Low* *2 – Low* *3 – Moderate* *4 – High* *5 – Very High*	Remarks
A	Weather and disaster forecast			
B	Political news			
C	Government projects			
D	Financing projects			
E	Environmental projects			
F	Information related to jobs (job fares)			
G	Laws and other policies			
H	Information from provincial and national government			
I	Information from LGU			
J	Information from the barangay			
K	Events (Health, Missions, etc.)			
L	Education (Scholarships)			
M	Prices of goods			

5. **Sources of information. Please indicate the three most important sources of information by marking asterisk (*) on the "Remarks" column.**

	Source of Information	Access *(0 – No; 1 – Yes)*
A	Newspaper	
B	Television	
C	Radio	
D	Knowledgeable people	
E	Neighbors, family, and friends	
F	Schools and universities	
G	Local government units	
H	Barangay announcements	
I	Computer and internet	
J	People outside the community	
K	People's Organization	

--- Thank You! ---

9. 국문 초록

기후변화는 여러 나라와 지역의 행위자들이 행동한 것이 누적되어 야기되는 세계적 문제이다. 따라서, 기후 변화 문제를 해결하기 위해서는 여러 협력적 집단 행동이 요구된다. 이런 다층의 이해관계자들간 협력과 협동은 네트워크에 의하여 가능하다. 이는 국가와 이해관계자 사이에서 지식의 교환을 용이하게 하며 협력을 강화한다. 기후 변화 문제 해결을 위한 행동에는 이해당사자들의 협력이 필요하며 지역 공동체가 기후 변화 완화 프로젝트에 참여하는 협력 활동은 사회적 자본을 증가시켜 지역 공동체의 발전에도 기여한다. 네트워크에 기반한 사회적 관계를 통해 지역 공동체들은 더 많은 경제적 이익을 얻는 기반이 되는 자산을 확장한다. 본 연구는 맹그로브 복원 프로젝트에 지역 사회가 참여하는 것이 사회적 자본에 미치는 영향을 평가했다. 더 나아가 본 연구는 사회적 자본이 지역 주민의 정보 접근 및 서비스 접근에 미치는 영향을 분석했다. 이 연구는 필리핀 퀘존 (Quezon)에서 실시되었으며 데이터 수집을 위해서 대면 인터뷰가 수행되었다. 본 연구의 결과로는 지역 주민의 참여가 그들의 생계를 향상하는데 도움이 되며 사회적 자본을 증진하는 것으로 확인되었다. 결과적으로 지역사회의 맹그로브 복원사업 참여가 사회자본 확장을 통하여 지역 주민의 정보와 서비스 접근성을 향상시키는데도 기여함을 밝혔다.

키워드 : 맹그로브 복원, 사회적 자본, 주민 생계, 참여, 필리핀

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